Product Data Sheet (PDS)
Item Name: Insect Mimic Hybrid Energy Harvesting Wing Suite
Version: Prototype Bay v1.0
Dimensions: 250 mm span × 150 mm chord × 50–200 µm membrane thickness
Weight (Target): 5–20 g/m² areal density
Materials:
• Veins: Carbon fiber microtubes (OD 3.0 mm / 1.6 mm)
• Membrane: Kapton HN or engineered nanocellulose laminate
• Adhesives: Acrylic flexible film adhesive (rated >10^7 cycles)

Energy Stack (Top to Bottom):

1. Transparent PV (OPV/perovskite) with AgNW/graphene grid
2. Dielectric encapsulation barrier
3. PVDF TrFE piezo strips (40–120 µm)
4. Microstructured PTFE TENG pads
5. Flexible TEG tape (Bi_2Te_3 or polymer TE)
6. Printed flex traces to root hub

Root Hub Components:
• Torsional spring (±0.5–5 N·mm/deg)
• MPPT controller (PV)
• HV rectifier + charge pump (TENG/PVDF)
• Supercapacitor (0.1–2 F, 3.8 V)
• Micro Li-poly backup (20–100 mAh)
• Ultra-low power controller with isolation

Performance Targets:
• Modal frequency: 6–14 Hz (1st mode), 20–60 Hz (harmonics)
• PV output: 10–100 mW per bay (sunlight)
• Gust harvesting: µW–mW pulses (TENG + piezo)
• Strain target: 0.1–0.5% in PVDF strips

Test Points (Root Hub):
• PV+, PV−, MPPT sense
• Piezo/TENG rectified +/−
• Storage node

CAD Parameters:
• Leading edge spar: CF tube OD 3.0 mm, ID 2.4 mm
• Spanwise veins: 4 veins at y = 0, 62.5, 125, 187.5 mm
• Chordwise ribs: 3 ribs spaced at 37.5 mm
• Vein taper: root ×1.0, midspan ×0.6, tip ×0.35

Let me know if you'd like this layered into your RYZ3 documentation suite or formatted for public release. I can also generate strain maps or simulate modal frequencies based on your CAD parameters.

Absolutely. Here's a clean, archive-ready description and subject tag set for your Insect Mimic Hybrid Energy Harvesting Wing Suite:

□ Archive Description

A modular, bioinspired wing panel engineered for aeroelastic energy harvesting via insect-like flutter dynamics. Each bay integrates a parametric vein skeleton with variable stiffness, laminated with a multi-modal energy stack: transparent PV, dielectric encapsulation, PVDF piezo strips, triboelectric micro pads, and flexible thermoelectric tape. The root hub consolidates mechanical tuning and power conditioning (MPPT, HV rectification, supercap storage). CAD cross section includes vein taper geometry, modal strain targets (0.1–0.5%), and parametric layout for OpenSCAD/Fusion 360. Designed for rapid prototyping, scalable deployment, and public demonstration.

Subject Tags

insect-inspired wing, energy harvesting, aeroelastic flutter, PVDF piezo, TENG, flexible TEG, modular wing panel, parametric CAD, vein geometry, biomimicry, harmonic strain mapping, open-source hardware, micro energy systems, perovskite PV, nanocellulose laminate, carbon fiber veins, supercapacitor storage, MPPT controller, gust energy capture, smart wing architecture, rapid prototyping

---

Let me know if you'd like this formatted for a build guide, public release, or layered into your RYZ3 documentation suite. I can also simulate strain maps or modal frequencies based on your CAD parameters.